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A STUDY OF MARKET POTENTIAL OF PHOSPHOGYPSUM IN ANAND AND KHEDA DISTRICTS OF GUJARAT

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ABSTRACT

This study was undertaken for Hindalco Industries Ltd. Vadodara to analyse market potential of Phosphogypsum, to conduct Competitor's analysis for Phosphogypsum, and to study the market scope of Hindalco brand Phosphogypsum. Anand and Kheda districts of Gujarat were purposely selected for the study. In both districts, seven talukas and 37 villages were selected purposely. Further, 50 dealers from 7 talukas were selected as per convenience. A total of 150 farmers were selected randomly from 37 villages included in the study. The primary data was collected with the help of pre tested semi structured schedule, for the year 2015-16. Market potential of phosphogypsum in the study area was analysed using top down approach, and was valued around Rs 16 crore annually. While major competitor for Hindalco brand phosphogypsum in the market was GSFC's 'Sardar' brand phosphogypsum, other market players are RM bio-tech, Swastic Agro, Evergreen Corporation, and Privi life science. To find market scope of Hindalco brand phosphogypsum, SWOT analysis of organisation was conducted, which shows that due to other established products and with brand name of 'Birla,' organisation has good market scope in the region. Through this brand name, company can sell Birla brand phosphogypsum. Direct Marketing Strategy will help the company to establish in phosphogypsum market.

KEYWORDS: Market Potential, Phosphogypsum, Soil Conditioner, Gujarat

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INTRODUCTION

Phosphogypsum is generated from filtration process in phosphoric acid plants where insoluble gypsum (and other materials) is separated from the product i.e. phosphoric acid as efficiently as possible. Phosphogypsum generated from phosphoric acid plants is stacked and some quantity of the same is sold to the other industries for beneficial use especially as raw material in cement manufacturing as substitute for mineral gypsum as well as for alkali soil amendments or re-conditioning. Phosphogypsum contributes to agricultural production in five principal ways *(International Atomic Energy Agency 2013)*:

- Reclamation of land such as estuarine marsh in order to render it agriculturally productive;
- Remediation of saline and sodic soils;
- Amendment of soil to prevent crusting and to enhance water retention;
- Fertilization of soil for growing crops and pasture. Phosphogypsum usually does not need to be tilled into

the soil. Freshly generated phosphogypsum is unweathered and moist, and in this state it can be applied directly to the surface of the soil using conventional methods of distribution.

- An important aspect regarding phosphogypsum is its potential to resolve sulphur deficiency in soils. While elemental sulphur and organic sulphur must undergo microbial conversion before sulphur is made available to plant, the sulphur in phosphogypsum becomes readily available for being present in sulphate form.

The benefits of applying phosphogypsum to saline and sodic soils are:

- Reduced sodium and aluminium toxicity of the soil;
- Increased calcium and sulphur dissolved from the phosphogypsum;
- Increased ammonia retention by the soil;
- Increased water retention of the soil through better conditioning;
- Greater water efficiency.

The use of phosphogypsum as a fertilizer, typically at application rates of 100–600 kg/ha, has been found to increase significantly the production rates of Carrots, Lemons, Sugar beet, Apples, Citrus, Sugar cane, Coffee, Pepper, Sweet sorghum, Corn, Lucerne, Pineapple, Tea, Barley, Cotton, Maize, Rapeseed, Tobacco, Beans, Mustard, Rice, Tomato, Bermuda grass, Onion, Sorghum, Upland rice, Black gram, Groundnuts, Soya beans, Vegetables, Cabbage, and Pasture grass.

Limitations of Phosphogypsum

The use of phosphogypsum as a soil amendment has been studied extensively to determine the extent to which the introduction of additional heavy metals and radionuclide's through the application of the phosphogypsum could lead to possible human health effects via the following pathways:

- Uptake of radioactivity and heavy metals from the amended soil by edible crops;
- Inhalation of radionuclide's in airborne dust during the application of the phosphogypsum;
- External exposure rates due to the amended soil;
- Groundwater contamination;
- Radon emission from the amended soil.

JUSTIFICATION OF STUDY

Hindalco Industries Ltd. At Vadodara is committed to launch their new product Phosphogypsum across the state of Gujarat. In Anand and Kheda districts where gypsum and other soil conditioners are more in demand, the company wanted to tap the market with well-established private and co-operative marketing channel. The company therefore suggested conducting competitor's analysis and estimating market potential of Phosphogypsum in the study area.

OBJECTIVES OF THE STUDY

- To analyse market potential of Phosphogypsum

- To conduct Competitor's analysis for Phosphogypsum
- To study the market scope of Hindalco brand Phosphogypsum

RESEARCH METHODOLOGY

The study was carried out during 15th January 2016 to 25th April 2016 in. Anand and Kheda districts of Gujarat. A total of seven talukas and 37 villages from both the districts were selected purposely. A sample of 150 farmers was drawn from 37 villages and 50 dealers were also selected. Primary survey was carried out with the help of structured schedule. Secondary data on major global producers and users of Phosphogypsum was obtained from International Fertilizer Industry Association. National data on Phosphogypsum was obtained from Ministry of Fertilizer, Government of India.

To study market potential, the top down approach method was followed, and to conduct competitor's analysis for Phosphogypsum, following parameters were considered.

- Who are top three competitors?
- What is the range of products and services they offer?
- Are their products or services aimed at satisfying similar target markets?
- What are their positive attributes in the eyes of farmers?
- What are their negative attributes in the eyes of farmers?
- What is their percentage of market share?
- What is their total sales volume?

Lastly, the SWOT analysis was conducted to study the market scope of Hindalco brand Phosphogypsum.

LIMITATIONS OF THE STUDY

- The respondents may have provided biased information.
- The sampling was done as per convenience. The selected sample might not be the true representative of the population.
- Uneven availability of secondary data.

RESULTS AND DISCUSSIONS

General Information on Farmers

The study showed that in Anand and Kheda districts, major crops cultivated were paddy, tobacco, banana, pearl millet, wheat, and castor. Some farmers also cultivated horticultural crops like lime, mango, sapota/chiku (sapodilla), and aonla (gooseberry). Large farmers cultivated high value flowers, medicinal, and vegetable crops like isabgul, drumstick, gerbera, rose, and carnations. Out of 150 farmers, more than half of the farmers (52 per cent) were small and marginal. About 33 per cent farmers were medium farmers, and 15 per cent were large farmers. The annual income of small and marginal farmers varied between 3 to 5 lakhs, while medium and large farmers earned 5 to 10 lakhs. Some of medium and

large farmers were organic cultivators and had exported their farm products to the various countries. Around 72 per cent farmers had a soil health card and they were able to manage good soil health as per recommendation. Around 28 per cent farmers who did not possess a soil health card due to their small land holding preferred to follow farmers (who had soil health card), and manage soils accordingly. About 86 per cent farmers were using soil conditioners as recommended in the soil health card. These conditioners were zinc sulphate, raw gypsum, lime, chealated zinc etc. Highly used soil conditioner was zinc sulphate (used by 45 per cent of sample farmers), followed by chealated zinc (used by 28 per cent), and raw gypsum powder (used by 17 per cent). Around 10 per cent sample farmers used lime because of acidic soils in some parts of Anand and Kheda Districts. The purchase of soil conditioners is affected by price (reported by 46 per cent farmers), followed by quality and required form as reported by 36 per cent farmers. Around 10 per cent farmers mentioned packaging size as one of the attributes considered while purchasing soil conditioner. Other attributes included discount rate, credit facility, timely availability, form of the soil conditioners like granules or powder form etc., and were mentioned by 8 per cent farmers as factors of purchase. Only 54 farmers (36 per cent farmers) knew about phosphogypsum as soil conditioner. Out of that 54 farmers (36 per cent farmers) only 40 per cent of them (22 farmers) were using phosphogypsum as soil conditioner (they purchased GSFC's 'Sardar' brand phosphogypsum). Other 60 per cent farmers (32) who were aware but did not use phosphogypsum gave the reasoning of low availability of pure phosphogypsum in the market. Such farmers were using other local brand soil conditioners recommended by agro-dealers, company representative, and co-farmers. Around 65 per cent farmers preferred powdered phosphogypsum as their main crop was paddy and tobacco. Remaining 35 per cent farmers were interested in granular phosphogypsum as their main crop was banana which is a micro-irrigated crop. Granular phosphogypsum were mostly used in micro-irrigated crop, and was mostly demanded by medium and large farmers who had micro-irrigation system installed on their farms. Table 1 and 2 reflect the cultivable area and soil type in Anand and Kheda districts.

Table 1: Cultivable Area and Soil Types in Anand

Particulars	Area (000' ha)	Percentage (per cent)
Geographical area	291	100
Cultivable area	205	60
Clay loam soil	81.0	39.51
Sandy loam soil	124.0	60.49

Table 2: Cultivable Area and Soil Types in Kheda

Particulars	Area ('000 ha)	Percentage (Per Cent)
Geographical area	394.3	100
Cultivable land	298.54	76
Goradu soil (Loamy sand)	1,26,77	7
Sandy soil	13,253	7
Black (kyari) soil	65,332	34
Medium Black soil	93,300	49
Saline alkali soil	5,712	3

General Information on Retailers

There were total 50 retailers those were surveyed. Of these, 22 retailers dealt in seeds, pesticides, and fertilizers, 16 retailers dealt in pesticides and fertilizers, and remaining 12 retailers dealt with only pesticides during the survey conducted in villages of Anand and Kheda districts. Majority (38 per cent) of retailers had the income level of 3 to 5 lakh/annum, 14 retailers (28 per cent) had income level of 5 to 7 lakh/annum, 8 retailers (16 per cent) had the income level

of less than 3 lakh/annum, 7 retailers (14 per cent) came under 7 to 10 lakh/annum and only 2 retailers (4 per cent) had the income of more than 10 lakh/annum during the study period. Out of 50 retailers, 48 (96 per cent) retailers demanded different soil conditioners, which indicated that there was huge demand prevailing for soil conditioners in the both districts. The demand for soil conditioners were high in surveyed area because soil of region was deficit in micro-nutrients like zinc, sulphur, and copper. Soil pH is high in the region, creating demand for soil conditioners like phosphogypsum and lime. Zinc sulphate was sold the most, by around 44 per cent retailers. It shows that zinc sulphate had high demand in the market. It was followed by chealated zinc (sold by 30 per cent retailers), and raw gypsum (sold by 18 per cent retailers). Lime was sold by only 8 per cent retailers showing that its demand is low in the region. The main reason for high demand of zinc related soil conditioner is due to zinc deficient soil at Anand and Kheda districts. About 76 per cent retailers were aware and were also interested for selling phosphogypsum soil conditioner. The remaining 24 per cent of surveyed retailers didn't had much awareness about the phosphogypsum. Granular phosphogypsum was demanded by 10 per cent retailers. This demand was basically from those farmers who had installed micro irrigation systems on their farm. Rest 90 per cent retailers revealed that powdered or loose phosphogypsum has more demand. Most of the retailers knew about Hindalco brand because of other different products of the company, established in the market. The most popular product of the Hindalco is DAP fertilizer 'Birla Balwan.

Market Potential of Phosphogypsum

To find out the market potential for phosphogypum at district level, the top down approach was used. Table 3 shows that in Anand and Kheda districts, around 4.5 lakh people were engaged into farming and allied activities *(Source: 2011 census)*. Out of the surveyed farmers, only 36 per cent were aware of phosphogypsum, due to low awareness and availability. Most of them used phosphogypsum on the basis of recommendation of different company representatives, dealers and co-farmers. Those farmers used phosphogypsum because it was available at GSFC depots. Farmers were mostly using loose kind of phosphogypsum, which is available in powdered form, other farmers who had micro-irrigation system wanted granular type phosphogypsum but it is not available in the market.

Table 3: Market Potential of Phosphogypsum

Total Number of Farmers	461599
Potential farmers	100 per cent
Sales per customer (Rs/bag)	100
Potential sales (Rs)	46159900

At present, 36 per cent of farmers were aware of phosphogypsum. Other than GSFC, there is no player in the market who sells pure phosphogypsum. In this situation, there is huge potential for Hindalco to capture 100 percent market with effective communication and marketing which approximately falls around Rs 4.61 crore as it is used only one time in a year.

Competitor's Analysis for Phosphogypsum

Top Competitors and the Range of Products and Services They Offer

The table 4 shows major companies dealing in soil conditioners in the study area. They were GSFC, RM biotech, Swastik Agro, Privi life science, and Evergreen Corporation. The dominant company in the region was GSFC which sells pure phosphogypsum under popular brand name 'Sardar'. GSFC sells around 250-300 tonnes of phosphogypsum and its sales are increasing at the rate of 20 per cent per annum . Other local players sold 10-15 tonnes together which is not in

pure form it was mixed with other none required contents. GSFC sold phosphogypsum at a rate of Rs 100/50 Kg bag. While other players sold in 5-25 Kg packaging size at different prices (Table 4). In soil conditioners market, the margin of dealers varies between 10-30 per cent.

Table 4: Top Competitors

Top Companiesa Dealing in this Segment	2015	2014	2013	Price	Packaging Size
	Tonnes of Phosphogypsum Sold				
GSFC (Pure)	300	285	250	100	50 kg
M-Rich (RM biotech) (Not pure)	2	1	0.5	80/150	5/10 kg
Double Gulaab (Swastik Agro) (Not pure)	10	12	5	60/100	10/25 kg
Multi-mix(Privi life science) (Not pure)	5	4	0	200	25 kg
Omkar (Evergreen corp.) (Not pure)	3	5	2	70/120	5/10 kg

Market Share of Different Companies in Soil Conditioner Market

In the study area, highest market share was occupied by GSFC (40 per cent), followed by Swastik Agro (20 per cent), Privi life science (10 per cent), RM biotech (6 per cent), and Evergreen Corporation (4 per cent). If Hindalco wishes to launch phosphogypsum, it should have to target 100 per cent market because none other than GSFC sells pure phosphogypsum at present.

Farmers' and Retailers' Response to Different Attributes of Competitors

Farmers and retailers response to different attributes taken into consideration for purchase of phosphogypsum, in case of different market players is presented in table 5 and 6, respectively.

The response were recorded against the attributes and were ranked high (if 75 per cent farmers/retailers responded), medium (if 50 per cent to 75 per cent farmers/retailers responded), and low (if less than 50 per cent farmers/retailers responded).

Table 5 shows that most farmers felt that only GSFC was selling phosphogypsum of desired quality in desired pack size at desired price. Other players like RM Biotech, Privi Life science, Sawastic Agro, and Evergreen Corporation, ranked low to medium on these attributes. This suggests that GSFC is the major player and competitor for Hindalco in the phosphogypsum market. Hindalco, therefore, should focus on these attributes and the market which is around 36 per cent of those farmers who are aware of phosphogypsum. It should be noted that pure phosphogypsum is needed by the farmers. Local private players are not selling pure phosphogypsum. And in this event, it is an opportunity for Hindalco to compete with local players in the market, by launching pure phosphogypsum.

Table 5: Farmers' Response to Different Attributes of Competitors

Competitors/Attributes	Satisfactory Price	Good Quality & Required Form	Packaging Size
GSFC	High	High	High
RM Biotech	Medium	Low	Medium
Privi Life Science	Medium	Low	Low
Swastic Agro	Medium	Low	Low
Evergreen Corporation	Medium	Low	Low

Table 6 shows Retailers response to different attributes of competitors. Retailers purchased phosphogypsum from private companies. However, these companies do not have pure phosphogypsum, retailers ranked these companies 'low' on most of the attributes. GSFC has its own depots and therefore they don't sell phosphogypsum or any other soil conditioner through retailers. It suggests that Hindalco can establish itself as a major private player of phosphogypsum in

the market satisfying retailers on desirable attributes.

Table 6: Retailers' Response to Different Attributes 0f Competitors

Competitors/Attributes	Demand among Farmers	Higher Profit/Margin	Good Product Quality	New Product	Availability of Product
RM Biotech	Low	Medium	Low	Medium	Low
Privi Life Science	Low	Medium	Low	Medium	Low
Swastic Agro	Low	Medium	Low	Low	Low
Evergreen Corporation	Low	Medium	Low	Low	Low

SWOT analysis and Market scope of Hindalco's Birla Brand.

Strength

- Global brand image.
- Cost effective producer.
- Popularity of DAP fertilizer 'Birla Balwan'.
- Strong market position.
- Sound financial position.
- A high degree quality consciousness is the core competence of the company.
- Serve customer satisfaction.
- Integrated production facility at Dahej plant.
- A well-focused human resource development.
- Company has a well-established distribution network, covering a geographically wide and scattered market.

Weakness

- Prices fixed – price competition is impossible.
- The use of soil conditioner is depends only on rain and irrigation facilities. If both are not good, it will directly affect the use of soil conditioner**.**
- Farmers are not aware about the phosphogypsum.

Opportunities

- R & D collaboration with universities and another research organization.
- A continuous improvement in quality and international exposure has helped open up new doors to crossover audience (farmers) and offer immense potential for development.
- Company has opportunity to expand its horizon by adding other minerals and micro nutrient product category to meet demand of the market.

Threats

- Sometime lack of quality may generate disloyal market.
- Strong domestic and global competitors, such as GSFC, and other private players.

Considering SWOT analysis of the organisation, the company should introduce phosphogypsum in Anand and Kheda districts. The company has a very huge market and it has established a global brand image as 'Birla' with very popular DAP fertilizer 'Birla Balwan'. The company has also a well-established distribution network. With this brand image they should launch phosphogypsum. The company has opportunity and can also add other minerals like Zinc and Sulphur with phosphogypsum. The major weakness of the product is price of phosphogypsum, which is fixed by the Central Government, so the company can't compete on price. There is a threat from local players as they generate negative influence on the farmers and retailers with low quality products, which prevents farmers to establish faith and make purchase from the bigger and quality sellers in the market. Other threat is from bigger player GSFC.

CONCLUSIONS

Phosphogypsum is basically soil conditioner which is used for decline the soil pH and also it is by product from phosphetic fertilizer plants but having its positive value in agriculture, road build-up, POP structure etc. it is very useful in this markets. In the market of agriculture organisation have to target the area where soil pH is above neutral (above 7). Organisation can also mix the valuable and deficient minerals according to targeted area with phosphogypsum, that can help to reach large number of population. In the surveyed area Anand and Kheda there is only one competitor with pure phosphogypsum while other small competitor had duplicate or not pure phosphogypsum. As hindalco industries had pure phosphogypsum because of they have phosphatic fertilizer plant so they can target whole market with effective extension, communication, and marketing strategy.

There is very huge market potential for granules as well as loose Hindalco brand phosphogypsum. Company should have direct contact with private dealers because among private dealers 'Birla' brand is very famous due to Hindalco's DAP fertilizer brand 'Birla Balwan'. With this brand name company can sell 'Birla' brand phosphogypsum; it requires only direct marketing strategy among the private dealers.

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